The first part of the volume is devoted to a discussion of lake basins, the discussion covering the origin of lake basins and of lakes, the obliteration of the basins, and the deposits made in them.

The second and larger part of the volume deals with the waters of lakes. Here are included (1) Hydrology — supply and waste; (2) Hydraulics, including the pressure of the water, the levels of lakes, their changes, permanent and temporary, rhythmic and non-rhythmic, the waves, seiches, currents, etc.; (3) Chemistry, including the comparative study of the waters flowing into the lakes, that in the lakes, and that flowing from them. Comparisons are also made with sea water; (4) The temperature of lakes, including a discussion of surface temperatures, their areal and periodic variations, comparisons of the temperature of the surface water with that of the overlying air, and the temperature of the sub-surface waters; a section is also given to the freezing of the lake water; (5) Optics, including the penetration of light, the color of the water, reflection, refraction, etc., under various conditions; (6) The biology of lakes. Besides the more obvious topics considered in this chapter, a section is given to the origin of lacustrine societies, and another to the physiology of lacustrine organisms.

In an appendix is given an outline for the prosecution of lacustrine studies, and also a bibliography.

The volume is the best brief compendium on the subject with which it deals. R. D. S.

A Preliminary Report on the Artesian Basins of Wyoming. Bulletin 45 of the Wyoming Experiment Station. By WILBUR C. KNIGHT.

While this report is primarily a consideration of the artesian basins of the state, its first part is devoted to a summary of existing knowledge concerning the geology of the state. The following systems of rocks are represented: Archean, Algonkian, Cambrian, Devonian, Carboniferous, Permian, Triassic, Jurassic, Cretaceous, Eocene, Oligocene, Miocene, and Pleistocene.

The Archean is found at various points in the mountain ranges. The Algonkian has a similar distribution, with a total maximum thickness, including some igneous rock, of 20,000 feet. Following the deposition of the Algonkian rock were great disturbances and elevations, followed by a prolonged period of erosion. The late Cambrian

and late Ordovician periods are represented by relatively thin formations, chiefly of limestone. The Ordovician is found only in the northern part of the state, and the Devonian, so far as now known, only in the northwestern. As elsewhere in this part of the United States, the Devonian seems to rest conformably on the Ordovician. The Carboniferous is more fully represented than the preceding systems. The Lower Carboniferous is found only in the northern half of the state, while the Upper is more widespread. Limestone is the dominant rock. The Permian occurs in the Laramie, Big Horn, and Wind River mountains. It has but slight thickness, 200 feet or so, but has the fauna characteristic of the period.

The Mesozoic systems are much more fully represented, being in the aggregate 20,000 to 30,000 feet thick. They are in general conformable on the Paleozoic.

The Triassic system is represented by the Red Beds, which are gypsiferous and without fossils. The Jurassic system is represented by a marine division, the Shirley formation, overlaid by a fresh-water division, the Como formation. Both formations are referred to the later third of the Jurassic period. No special reasons are given for assigning the Como to the Jurassic, rather than to the Lower Cretaceous. This formation is said to have covered most, if not all of the state, and its character is such as to indicate marshy and lacustrine conditions.

The Cretaceous formations are the most extensive in the state. They cover about 50,000 square miles, and the thickness is 20,000 to 25,000 feet. The following formations are present: The Dakota, Bear River, Fort Benton, Niobrara (which contains some chalk), the Fort Pierre and Fox Hills formations, which together are, at the maximum, something more than two miles thick, and the Laramie, which has a thickness of about one mile. The Montana division (Fort Pierre and Fox Hills) contains some oil and coal, and the Laramie much coal. The Fort Union beds are also placed with the Cretaceous, with a question.

The areas of the Tertiary rocks are characterized by the Bad Land topography. The Eocene is represented by the Bridger, Green River, and Wasatch beds; the Oligocene by the White River beds; the Miocene by the Loup Fork. The Eocene beds have an aggregate thickness of 3500 feet, the White River of 1500, and the Loup Fork of 500. Pliocene beds are not known.

During the Pleistocene there were very considerable glaciers in the Wind River, Absaroka, Shoshone, Big Horn, and Medicine Bow mountains, as well as in the Yellowstone Park. Glaciers also reached the state line from the Uinta Mountains. No subdivisions of the glacial period have been made out.

The report is accompanied by an uncolored geological map, which is, we believe, the first geological map of the state which has been published. R..D. S

Die vierte Eiszeit im Bereiche der Alpen, von ALBRECHT PENCK. Vorträge des Vereines zur Verbreitung naturwissenschaftlicher Kenntnisse in Wien. XXXIX. Jahrgang. Heft 3, 1899.

In this little pamphlet, as the title implies, Dr. Penck recognizes four distinct epochs of glaciation (instead of three as heretofore) in the Alps. The additional epoch which is here added belongs to the earlier rather than to the later stage of the glacial period. The differentiation of these several epochs is based primarily on the topographic distribution of the deposits made by the waters which flowed from the ice, the deposits of the several epochs being so disposed as to show very considerable periods of erosion between the periods of fluvioglacial deposition.

This paper is of interest in that it helps to bring the phenomena of this somewhat isolated area of glaciation into still closer correspondence with the phenomena of the greater areas of glaciation in northwestern Europe and North America.

R. D. S.